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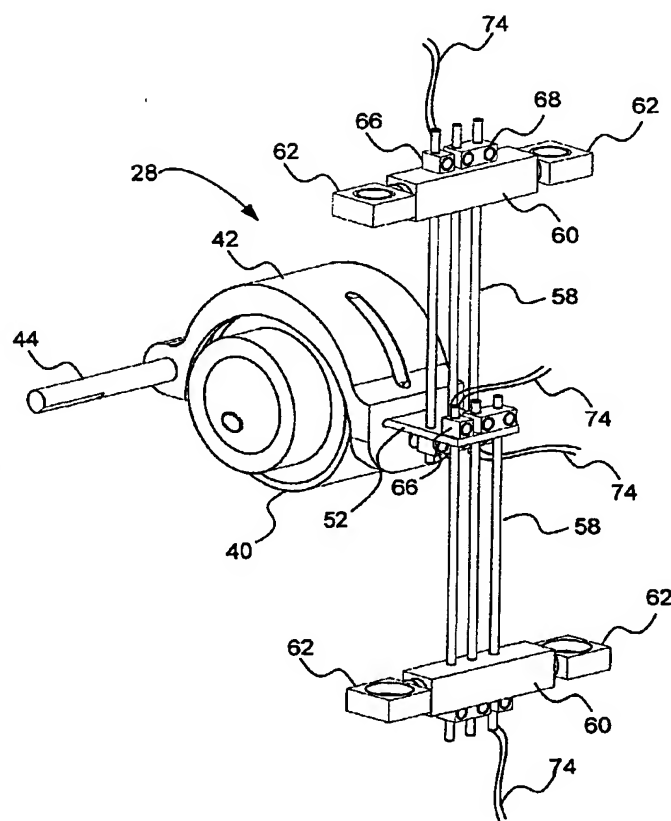
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(54) Title: HIGH POWER/WEIGHT RATIO BRAKING DEVICE BASED ON SHAPE MEMORY MATERIAL TECHNOLOGY



(57) Abstract: The braking device (28) is provided a set
of shape memory alloy activators (58) positioned, in an ag-
onistic-antagonistic configuration on each side of a brake
lever (42). Braking and releasing phases are dictated by the
austenitic transformation of the shape memory alloy acti-
vators. During brake activation, shrinking of the braking
activator brings the friction pad (52) in contact with a rotat-
ing drum (40) creating a braking friction torque. Once the
brake has been activated, deformation of a flexible fiber-
glass component (52) prevents brake releasing by applying
sufficient normal force between the drum and the friction
pad. Conversely, upon heating of the releasing activator,
the pad loses its grip and the drum is free to rotate.

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GM, KE, LS, MW, MZ, SD, SL, SZ, TZ, UG, ZM, ZW), Eurasian (AM, AZ, BY, KG, KZ, MD, RU, TJ, TM), European (AT, BE, BG, CH, CY, CZ, DE, DK, EE, ES, FI, FR, GB, GR, HU, IE, IT, LU, MC, NL, PL, PT, RO, SE, SI, SK, TR), OAPI (BF, BJ, CF, CG, CI, CM, GA, GN, GQ, GW, ML, MR, NE, SN, TD, TG).

— *before the expiration of the time limit for amending the claims and to be republished in the event of receipt of amendments*

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INTERNATIONAL SEARCH REPORT

International Application No

PCT/CA2004/000590

A. CLASSIFICATION OF SUBJECT MATTER

IPC 7 F16D49/00 F16D65/14 A61F2/30 F03G7/06

According to International Patent Classification (IPC) or to both national classification and IPC

B. FIELDS SEARCHED

Minimum documentation searched (classification system followed by classification symbols)

IPC 7 F16D F03G A61F

Documentation searched other than minimum documentation to the extent that such documents are included in the fields searched

Electronic data base consulted during the international search (name of data base and, where practical, search terms used)

EPO-Internal, PAJ

C. DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
X	US 6 286 635 B1 (TAMOR) 11 September 2001 (2001-09-11) column 2, line 36 - column 3, line 22; figure 1	1
X	----- PATENT ABSTRACTS OF JAPAN vol. 0151, no. 74 (M-1109), 2 May 1991 (1991-05-02) & JP 3 037433 A (SONY), 18 February 1991 (1991-02-18) abstract	1, 4-7
A	----- PATENT ABSTRACTS OF JAPAN vol. 0151, no. 03 (P-1178), 12 March 1991 (1991-03-12) & JP 2 310856 A (NEC ENG LTD), 26 December 1990 (1990-12-26) abstract ----- -/-	1, 4, 7

☒ Further documents are listed in the continuation of box C.☒ Patent family members are listed in annex.

* Special categories of cited documents:

- *A* document defining the general state of the art which is not considered to be of particular relevance
- *E* earlier document but published on or after the international filing date
- *L* document which may throw doubts on priority claim(s) or which is cited to establish the publication date of another citation or other special reason (as specified)
- *O* document referring to an oral disclosure, use, exhibition or other means
- *P* document published prior to the international filing date but later than the priority date claimed

- *T* later document published after the international filing date or priority date and not in conflict with the application but cited to understand the principle or theory underlying the invention
- *X* document of particular relevance; the claimed invention cannot be considered novel or cannot be considered to involve an inventive step when the document is taken alone
- *Y* document of particular relevance; the claimed invention cannot be considered to involve an inventive step when the document is combined with one or more other such documents, such combination being obvious to a person skilled in the art.
- *Z* document member of the same patent family

Date of the actual completion of the international search

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Name and mailing address of the ISA

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INTERNATIONAL SEARCH REPORT

International Application No

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C.(Continuation) DOCUMENTS CONSIDERED TO BE RELEVANT

Category *	Citation of document, with indication, where appropriate, of the relevant passages	Relevant to claim No.
A	DE 40 16 146 C (SIEMENS) 14 August 1991 (1991-08-14) the whole document -----	1, 4
A	US 4 932 210 A (JULIEN ET AL.) 12 June 1990 (1990-06-12) column 6, line 21 - line 42; figure 1 -----	1, 4-6
X	US 3 557 387 A (OHLENBUSCH ET AL.) 26 January 1971 (1971-01-26) column 4, line 44 - column 5, line 19; figures 1-11 -----	14-17
X	WO 94/09727 A (ANDREWS) 11 May 1994 (1994-05-11) page 17, line 17 - page 19, line 11; figure 8 page 30, line 24 - page 31, line 2 -----	14, 15
X	US 4 792 338 A (RENNERFELT) 20 December 1988 (1988-12-20) column 3, line 4 - line 34; figures 2, 3 column 5, line 49 - line 55 -----	14, 15

INTERNATIONAL SEARCH REPORT

Information on patent family members

International Application No

PCT/CA2004/000590

Patent document cited in search report		Publication date	Patent family member(s)	Publication date
US 6286635	B1	11-09-2001	NONE	
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INTERNATIONAL SEARCH REPORT

International application No.
PCT/CA2004/000590

Box II Observations where certain claims were found unsearchable (Continuation of item 2 of first sheet)

This International Search Report has not been established in respect of certain claims under Article 17(2)(a) for the following reasons:

1. ☐ Claims Nos.:
because they relate to subject matter not required to be searched by this Authority, namely:
2. ☐ Claims Nos.:
because they relate to parts of the International Application that do not comply with the prescribed requirements to such an extent that no meaningful International Search can be carried out, specifically:
3. ☐ Claims Nos.:
because they are dependent claims and are not drafted in accordance with the second and third sentences of Rule 6.4(a).

Box III Observations where unity of invention is lacking (Continuation of item 3 of first sheet)

This International Searching Authority found multiple inventions in this international application, as follows:

see additional sheet

1. ☒ As all required additional search fees were timely paid by the applicant, this International Search Report covers all searchable claims.
2. ☐ As all searchable claims could be searched without effort justifying an additional fee, this Authority did not invite payment of any additional fee.
3. ☐ As only some of the required additional search fees were timely paid by the applicant, this International Search Report covers only those claims for which fees were paid, specifically claims Nos.:
4. ☐ No required additional search fees were timely paid by the applicant. Consequently, this International Search Report is restricted to the invention first mentioned in the claims; it is covered by claims Nos.:

Remark on Protest

- ☐ The additional search fees were accompanied by the applicant's protest.
- ☒ No protest accompanied the payment of additional search fees.

FURTHER INFORMATION CONTINUED FROM PCT/ISA/ 210

This International Searching Authority found multiple (groups of) inventions in this international application, as follows:

1. claims: 1-13

Friction brake with a two actuators, respectively applying or releasing the brake.

2. claims: 14-20

Prosthesis with two relatively-rotating limbs connected by a mechanical joint, an actuator moving the limbs and a brake acting on the actuator to inhibit relative movement in the joint.
